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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,347	12/03/2003	Richard C. Chu	POU920030167US1	9034

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EXAMINER	
HOFFBERG, ROBERT JOSEPH	

ART UNIT	PAPER NUMBER
2835	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/726,347	CHU ET AL.	
	Examiner	Art Unit	
	Robert J. Hoffberg	2835	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-11, 16-24 and 28-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,182,742).

With respect to Claim 1, Takahashi et al. teaches a cooling system comprising: a coolant conditioning unit (CCU) (Fig. 1, #1100A), each CCU providing system coolant to an associated electronics subsystem (Fig. 1, #100) of multiple electronics subsystems (Col. 2, lines 34-35) to be cooled; and wherein each CCU of the at least some CCUs comprises a heat exchanger (Fig. 1, #1120A), a first cooling loop (left side of Fig. 1, #1120A) with a valve (Fig. 1, #1170A), and a second cooling loop (right side of Fig. 1, #1120A), the first cooling loop receiving chilled facility coolant (Col. 3, lines 19-20) from a source and passing at least a portion thereof via the control valve through the heat exchanger, the second cooling loop providing cooled system coolant (Col. 3, line 21) to the associated electronics subsystem, and expelling heat in the heat exchanger from the associated electronics subsystem to the chilled facility coolant in the first cooling loop, wherein the control valve (Col. 3, lines 19-24) allows regulation of facility coolant flow through the heat exchanger, thereby allowing independent control of a desired

temperature of the system coolant in the second cooling loop for cooling the associated electronics subsystem. Takahashi et al. fails to teach multiple CCUs cooling different electronic subsystems. While Takahashi et al. teaches only a CCU to cool an associated cooling system, it has been held that duplicating of parts and having a second CCU cooling a second associated electronics system would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple CCUs to cool multiple associated electronics subsystems independently.

With respect to Claim 2, Takahashi et al. further teaches wherein the source of chilled facility coolant comprises a common source (Fig. 1, arrows on left side) coolant supplied to the at least some CCUs.

With respect to Claims 3, 9, 18 and 22, Takahashi et al. teaches the cooling system, the cooled electronics system or the method of the above claims. Takahashi et al. fails to teach multiple CCUs and redundant facility coolant supply and return lines. While Takahashi et al. teaches only a CCU to cool an associated cooling system, it has been held that duplicating of parts and having multiple CCUs with redundant facility coolant supply lines and redundant facility coolant return lines independently servicing the CCUs, would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple CCUs including

redundant facility coolant supply lines and redundant facility coolant return lines independently servicing the CCUs to increase the reliability of the cooling system.

With respect to Claim 4, Takahashi et al. further teaches wherein the CCU wherein each CCU is associated with an electronics subsystem to be cooled (Col. 2, lines 34-35). Takahashi et al. fails to teach multiple dedicated CCUs cooling an associated, different electronic subsystems. While Takahashi et al. teaches only a CCU to cool an associated cooling system, it has been held that duplicating of parts and having a second dedicated CCU cooling a second associated electronics system would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple dedicated CCUs to cool multiple different associated electronics subsystems independently.

With respect to Claim 5, Takahashi et al. further teaches wherein the multiple electronics subsystems comprise multiple electronics racks (Col. 2, line 33 computer). While Takahashi teaches multiple electronic racks, it fails to teach each rack being cooled by an associated, dedicated CCU of the multiple CCUs. It has been held that duplicating of parts and having a multiple dedicated CCUs cooling a multiple electronic rack would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple dedicated CCUs to cool multiple electronic racks independently.

With respect to Claim 6, Takahashi et al. further teaches wherein the CCUs comprise CCU pairs, each CCU pair comprising a dedicated CCU (Fig. 1, #1100A) and a redundant dedicated CCU (Fig. 1, #1100B) for cooling a different, associated electronics subsystem (Col. 2, lines 34-36) of the multiple electronics subsystems. While Takahashi et al. teaches only a CCU to cool an associated cooling system, it has been held that duplicating of parts and having a multiple CCU having CCU pairs cooling multiple associated electronics system respectively would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple dedicated CCUs to cool multiple different associated electronics subsystems independently.

With respect to Claim 7, Takahashi et al. further teaches a controller (Fig. 1, #2000) for monitoring operation of the CCU pairs and upon detection of a failure (Col. 3, lines 58-64) in a dedicated CCU for automatically switching to the redundant dedicated CCU of the CCU pair having the failure to ensure continued cooling of the associated electronics subsystem.

With respect to Claim 8, Takahashi et al. further teaches shutoff valves (Fig. 1, #1170A and #1180A) coupled to the dedicated CCU and the redundant dedicated CCU of each CCU pair of the CCU pairs for selectively directing chilled facility coolant flow through one of the CCUs of the CCU pair. While Takahashi et al. teaches only a CCU, it has been held that duplicating of parts and having a multiple CCU having CCU pairs would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669,

124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple CCUs to cool multiple different associated electronics subsystems independently.

With respect to Claim 10, Takahashi et al. further teaches a controller (Fig. 1, #2000) and a redundant controller (Col. 4, line 12) for monitoring operation of the CCU pairs, the redundant controller functioning (Col. 4, lines 12-13) in place of the controller upon detection of a failure in the controller.

With respect to Claim 11, Takahashi et al. further teaches wherein each CCU of the at least some CCUs further includes a reservoir (Fig. 1, #1400) in series with the second cooling loop for ensuring an adequate supply of system coolant flow through the second cooling loop. While Takahashi et al. teaches only a CCU including a reservoir, it has been held that duplicating of parts and having a second CCU including a reservoir would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have a second CCUs with a reservoir to cool multiple different associated electronics subsystems independently.

With respect to Claim 16, Takahashi et al. teaches a cooled electronics system comprising: an electronics subsystem (Fig. 1, #100); a coolant conditioning units CCUs (Fig. 1, #1100A), the CCU providing system coolant to an associated electronics subsystem; and wherein the CCU comprises a heat exchanger (Fig. 1, #1120A), a first cooling loop (left side of Fig. 1, #1120A) with a control valve (Fig. 1, #1170A), and a second cooling loop (right side of Fig. 1, #1120A), the first cooling loop receiving chilled

facility coolant (Col. 3, lines 19-20) from a source and passing at least a portion thereof via the control valve through the heat exchanger, the second cooling loop providing cooled system coolant (Col. 3, line 21) to the associated electronics subsystem, and expelling heat in the heat exchanger from the associated electronics subsystem to the chilled facility coolant in the first cooling loop, wherein the control valve (Col. 3, lines 19-24) allows regulation of facility coolant flow through the heat exchanger, thereby allowing independent control of temperature of the system coolant in the second cooling loop for cooling the associated electronics subsystem. Takahashi et al. fails to teach multiple CCUs cooling different electronic subsystems. While Takahashi et al. teaches only a CCU to cool an associated cooling system, it has been held that duplicating of parts and having a second dedicated CCU cooling a second associated electronics system would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple CCUs to cool multiple different, associated electronics subsystems independently.

With respect to Claim 17, Takahashi et al. further teaches wherein the multiple electronics subsystems comprise multiple electronics racks (Col. 2, line 33 computer).

With respect to Claim 19, Takahashi et al. further teaches wherein the CCUs comprise a CU pairs, the CCU pair comprising a dedicated CCU (Fig. 1, #1100A) and a redundant dedicated CCU (Fig. 1, #1100B) for cooling a different, associated electronics subsystem. Takahashi et al. fails to teach multiple CCUs cooling different electronic subsystems. While Takahashi et al. teaches only a CCU to cool an

associated cooling system, it has been held that duplicating of parts and having a multiple CCU having CCU pairs cooling multiple associated electronics system respectively would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple dedicated CCUs to cool multiple different associated electronics subsystems independently.

With respect to Claim 20, Takahashi et al. further teaches a controller (Fig. 1, #2000) for monitoring operation of the CCU pairs and upon detection of a failure (Col. 3, lines 58-64) in a dedicated CCU for automatically switching to the redundant dedicated CCU for the CCU pair having the failure to ensure continued cooling of the associated electronics subsystem.

With respect to Claim 21, Takahashi et al. further teaches shutoff valves (Fig. 1, #1170A and #1180A) coupled to the dedicated CCU and the redundant CCU of each CCU pair of the CCU pairs for selectively directing chilled facility coolant through one of the CCUs of the CCU pair. While Takahashi et al. teaches only a CCU, it has been held that duplicating of parts and having a multiple CCU having CCU pairs would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple CCUs to cool multiple different associated electronics subsystems independently.

With respect to Claim 23, Takahashi et al. further teaches a redundant controller (Col. 4, line 12) for monitoring operation of the CCU pairs, the redundant controller

functioning (Col. 4, lines 12-13) in place of the controller upon detection of a failure in the controller.

With respect to Claim 24, Takahashi et al. further teaches wherein each CCU of at further includes a reservoir (Fig. 1, #1400) in series with the second cooling loop for ensuring adequate system coolant flow through the second cooling loop. While Takahashi et al. teaches only a CCU including a reservoir, it has been held that duplicating of parts and having a second CCU including a reservoir would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have a second CCUs with a reservoir to cool multiple different associated electronics subsystems independently.

With respect to Claim 28, Takahashi et al. teaches a method for cooling multiple electronics subsystems (Fig. 1, #100 and Col. 2, lines 34-35), the method comprising: providing a coolant conditioning units (CCUs) (Fig. 1, #1100A), each CCU providing system coolant to a different, associated electronics subsystem to be cooled, wherein each CCU comprises a heat exchanger (Fig. 1, #1120A), a first cooling loop (left side of Fig. 1, #1120A) with a control valve (Fig. 1, #1170A), and a second cooling loop (right side of Fig. 1, #1120A) with system coolant (Col. 3, line 21); providing, for each CCU chilled facility coolant (Col. 3, lines 19-20) to the first cooling loop from a source and passing at least a portion thereof via the control valve through the heat exchanger; providing, for each CCU cooled system coolant within the second cooling loop to the associated electronics subsystem, and expelling heat in the heat exchanger from the

associated electronics subsystem to the chilled facility coolant in the first cooling loop; and wherein the control valve (Col. 3, lines 19-24) of the CCU allows regulation of facility coolant flow through the heat exchanger, thereby allowing independent control of a desired temperature of the system coolant in the second cooling loop for cooling the associated electronics subsystem. Takahashi et al. fails to teach multiple CCUs cooling different electronic subsystems. While Takahashi et al. teaches only a CCU to cool an associated cooling system, it has been held that duplicating of parts and having a second dedicated CCU cooling a second associated electronics system would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et al. to have multiple CCUs to cool multiple different, associated electronics subsystems independently.

With respect to Claim 29, Takahashi et al. further teaches wherein the providing of the CCUs comprises providing CCU pairs, each CCU pair comprising a dedicated CCU (Fig. 1, #1100A) and a redundant dedicated CCU (Fig. 1, #1100B) for cooling a different, associated electronics subsystem of the multiple electronics subsystems. While Takahashi et al. teaches only a CCU to cool an associated cooling system, it has been held that duplicating of parts and having a multiple CCU having CCU pairs cooling multiple associated electronics system respectively would be held as obvious to one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would be obvious to one skilled in the art to modify the cooling system of Takahashi et

al. to have multiple dedicated CCUs to cool multiple different associated electronics subsystems independently.

With respect to Claim 30, Takahashi et al. further teaches monitoring operation of the CCU pairs and upon detection of a failure (Col. 3, lines 58-64) at a dedicated CCU, automatically switching to the redundant dedicated CCU of the CCU pair having the failure to ensure continued cooling of the associated electronics subsystem.

With respect to Claim 31, Takahashi et al. further teaches monitoring operation of the CCU pairs and upon detection of a failure at a dedicated CCU, automatically switching to the redundant dedicated CCU of the CCU pair having the failure (Col. 3, lines 58-64) to ensure continued cooling of the associated electronics subsystem.

With respect to Claim 32, Takahashi et al. further teaches providing redundant controllers (Col. 4, line 12) for monitoring operation of the CCU pairs, and automatically switching control to a redundant controller (Col. 4, lines 12-13) upon detection of a failure in one controller.

3. Claims 12-15 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,182,742) as applied to the above claims, in view of Nakagawa et al. (US 2003/0081380).

With respect to Claims 12, 13, 15, 25 and 27, Takahashi et al. teaches the cooling system or cooled electronic system of claims 1 or 16. Takahashi et al. does not teach the external system coolant reservoir with upward extending supply line. Nakagawa et al. further teaches wherein a shared external system coolant reservoir (Figs. 10 and 11) ensuring sufficient system coolant to the second cooling loop of each

CCU of the at least some CCUs as needed (Para. 0051). While Takahashi et al. in view of Nakagawa et al. does not teach the external system coolant reservoir shared by at least two CCUs of the at least some CCUs for ensuring sufficient system coolant flow through the second cooling loop of each CCU of the at least two CCUs, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the cooling system of Takahashi et al. with that of Nakagawa et al. for the purpose of having a reserve tank for replenishing liquid into the cooling system. Furthermore, it would be obvious to one of ordinary skill in the art at the time of the invention was made to provide to provide multiple lines from the reserve tank to a plurality of CCUs. It has been held that a mere duplication of parts has no patentable significance and would be obvious to one ordinary skill in the art at the time of the invention. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). Nakagawa et al. further teaches wherein each second cooling loop of the at least two CCUs is coupled to the common supply line via an upwardly extending branch line (see Fig. 11 and Para. 0050 line 5, reservoir in upper left corner is above CCU) which continues to hold system coolant notwithstanding removal of system coolant from the common supply line. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the cooling system of Takahashi et al. with that of Nakagawa et al. for the purpose placing the external reservoir above the CCUs to preventing draining of fluid in the CCUs into the external reservoir.

With respect to Claim 14 and 26, Takahashi et al. teaches the cooling system or cooled electronics system of the above claims. While Takahashi et al. does not teach

does not teach the redundant facility coolant supply lines and wherein a fluid communication path failure in one supply line or one second cooling loop only affects the CCU having the failing supply line or failing second cooling loop, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to duplicate the chilled facility coolant source input lines wherein a failure would affect only an individual CCU and not the entire system to insure redundancy in case of a failure of an individual chilled facility coolant source or its supply lines. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

Response to Arguments

4. Applicant's arguments, filed 3/16/06, with respect to the rejection(s) of claim(s) 1-32 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made above. While Takahashi et al. (US 6,182,742) teaches cooling of a plurality of electronic system (Col. 2, lines 34-36), it fails to teach the independent cooling of each of these systems. However, it has been held obvious in the art to duplicate the cooling system of Takahashi et al. and provide another CCU for each of the different, associated electronic system that needs to be cooled. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

5. While applicant teaches controlling the flow of the facility coolant and Takahashi et al. teaches controlling the flow of the system coolant, both have the effect of controlling the heat transfer rate of the heat exchanger and thereby allowing

independent control of a desired temperature of the system coolant in the second cooling loop for cooling the associated electronics subsystem.

6. Examiner's rejection of Terminal Disclaimer is withdrawn based upon applicant's terminal disclaimer filing.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kawashima et al. (US 4,865,123) teaches a plurality of CCUs in an electronic system. Hare et al. (US 6,035,655) and Stahl et al. (US 6,161,612) teach redundant cooling systems. Stefani (US 5,226,471) teaches a bypassing to isolate a leaking CCU. Mizuno et al. teaches a controller to control the operation of the CCUs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert J. Hoffberg whose telephone number is (571) 272-2761. The examiner can normally be reached on 8:30 AM - 4:30 PM Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn D. Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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